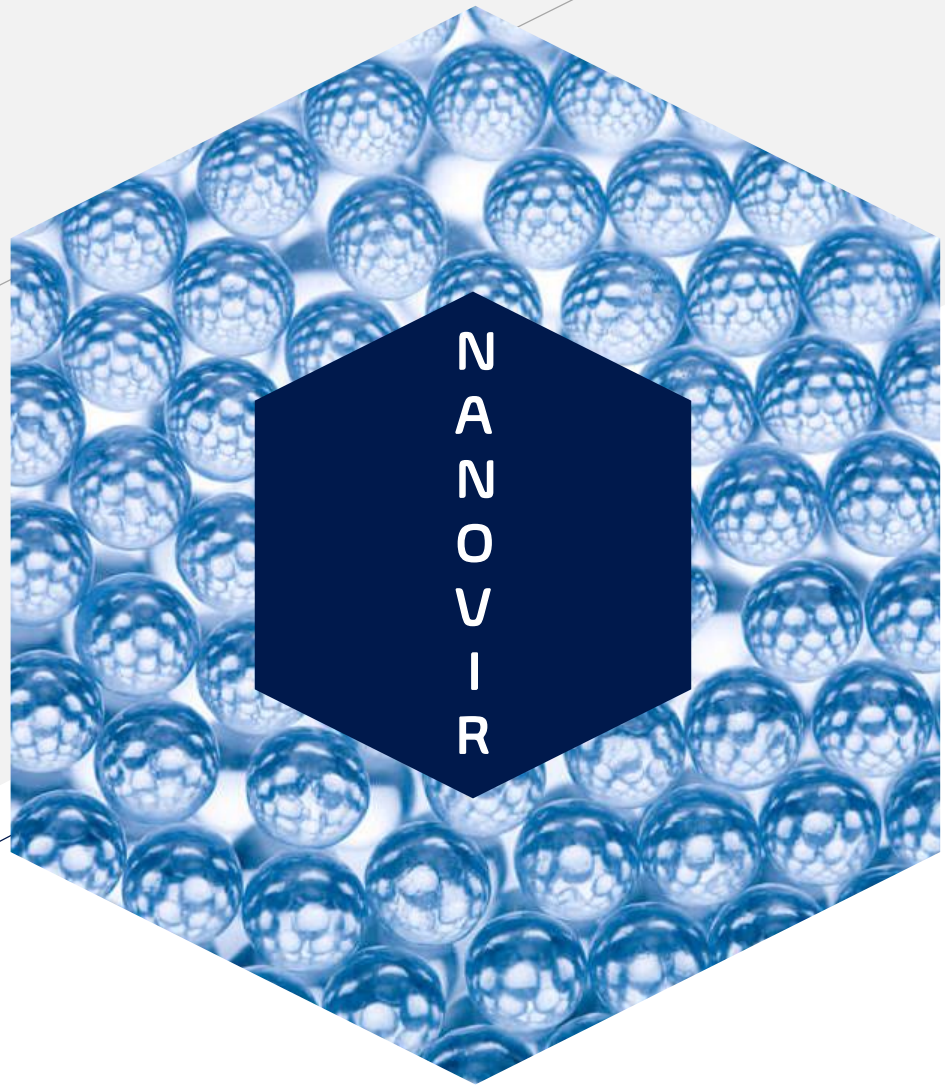


NANOVIR

Nanoparticles for solving diagnostic and therapeutic problems with COVID-19

Team

Participants on the project

Institute of Physics, UPJS

Department of Condensed Matter Physics

Institute of Chemistry, UPJS

Department of Inorganic Chemistry

Institute of Biology and Ecology, UPJS

Department of Molecular Biology

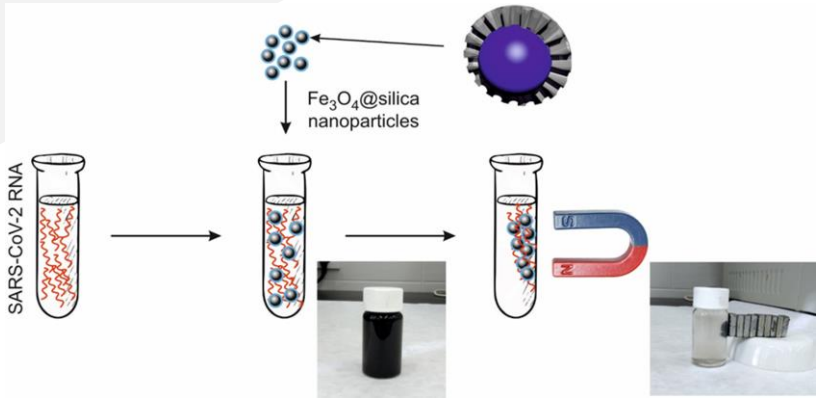
Institute of Experimental Physics, SAS

Department of Epizootiology and Preventive Veterinary Medicine, UVMP

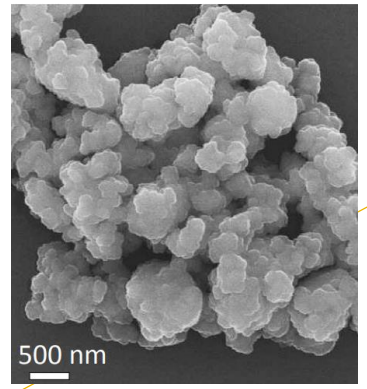
Aims of the project NANOVIR

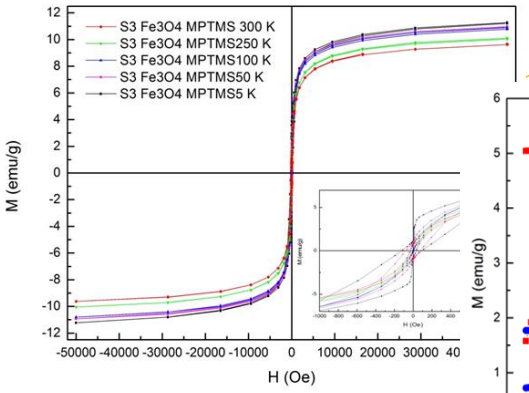
- improve laboratory diagnostics by using new variations of **silica-coated magnetic nanoparticles** for the isolation of viral RNA with subsequent detection by RT-qPCR method together with effective control of swab quality

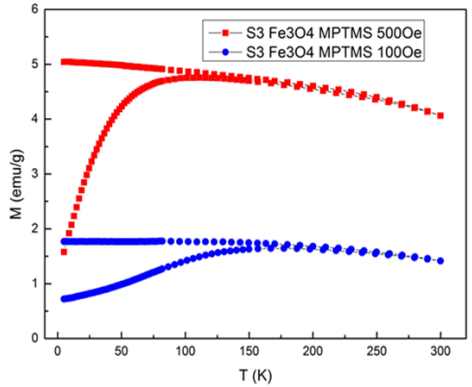
- explore the potential of **antiviral therapy** and the perspectives of antiviral administration using biocompatible systems for the administration of prolonged-release drugs based on SiO_2 nanoparticles for more effective diagnosis and therapy of COVID-19



SiO_2@MNPs 0.5







About Us

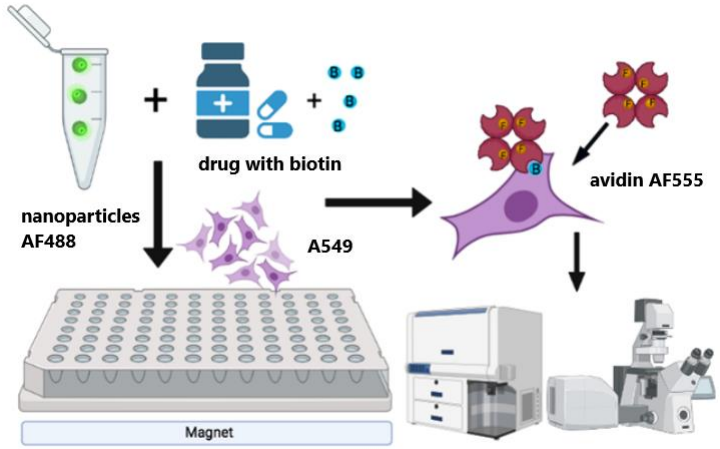
Interdisciplinary research team
(physicists, chemists, virologists, biologists)

with long-term international scientific cooperation across a wide range of scientific disciplines, based on top domestic experts which rich international scientific cooperation will help increase the participation of Slovak research institutions in international research projects aimed at combating the COVID-19 pandemic

Professional activities of the project

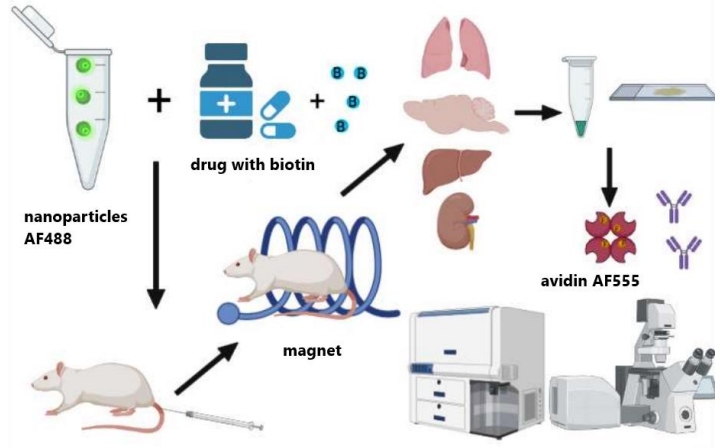
1. Research activity - Improve laboratory diagnostics of COVID-19 by using new variations of silica-coated magnetic nanoparticles for viral RNA isolation followed by RT-qPCR detection together with effective swab quality control

- **Topic 1:** Design the preparation of functionalized magnetic particles with a core-shell, FeOx @ SiO_2 structure (where Ox = magnetite or maghemite) and tune these for the most efficient nucleic acid separation for sensitive detection of COVID-19 but with the potential for other viruses.
- **Topic 2:** To develop a procedure for quality control of collected swabs using the isolation of cellular DNA and its detection in a sample with PCR evidence of a cellular gene.
- **Topic 3:** In collaboration with a commercial laboratory, to test selected nanoparticles on real clinical samples infected with SARS-CoV-2.



2. Research activity - Explore the potential of antiviral therapy and the perspectives for antiviral delivery using biocompatible SiO_2 nanoparticle-based prolonged drug delivery systems

- **Topic 1:** To prepare composite magnetic materials with a core-shell structure of the Fe_3O_4 @ SiO_2 type and to investigate the potential of such nanoparticles as antiviral carriers and their targeted transport.
- **Topic 2:** Analyze the efficiency of transport and the method of passage of composite materials based on magnetic nanoparticles with the drug across the cell membrane in an *in vitro* environment. To analyze the influence of magnetic nanoparticles on the viability and metabolic activity of cells *in vitro*.
- **Topic 3:** Analyze the transport efficiency of magnetic nanoparticle-based composite materials into cells *in vivo* after i.v. administration to rats in the context of *in vitro* test results.



We are interested in topics:

- Partnerships in Health (2022) (HORIZON-HLTH-2022-CARE-10)
- A competitive health-related industry (2022) (HORIZON-HLTH-2022-IND-13)
- Research and Innovation actions supporting the implementation of the Mission on Cancer (HORIZON-MISS-2021-CANCER-02)

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